COURSE OUTLINE: CVC617 - WHEEL END BRAKE SYS

Prepared: Josh Boucher
Approved: Corey Meunier, Chair, Technology and Skilled Trades

Course Code: Title	CVC617: WHEEL END ASSEMBLIES AND BRAKE SYSTEMS
Program Number: Name	6080: COMM VEHICLE-COMMON
Department:	MOTIVE POWER APPRENTICESHIP
Semesters/Terms:	22S, 21F, 22W
Course Description:	Upon successful completion the apprentice is able to perform adjustments and repairs to wheel end assemblies, and is able to recommend and perform repairs to hydraulic brake systems - all according to manufacturers` recommendations and statutory criteria.
Total Credits:	4
Hours/Week:	0
Total Hours:	32
Prerequisites:	There are no pre-requisites for this course.
Corequisites:	There are no co-requisites for this course.
Essential Employability Skills (EES) addressed in this course:	EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication. EES 3 Execute mathematical operations accurately. EES 4 Apply a systematic approach to solve problems. EES 5 Use a variety of thinking skills to anticipate and solve problems. EES 6 Locate, select, organize, and document information using appropriate technology and information systems. EES 7 Analyze, evaluate, and apply relevant information from a variety of sources. EES 8 Show respect for the diverse opinions, values, belief systems, and contributions of others. EES 9 Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals. EES 10 Manage the use of time and other resources to complete projects. EES 11 Take responsibility for ones own actions, decisions, and consequences.
General Education Themes:	Science and Technology
Course Evaluation:	Passing Grade: 50%, D A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation.
Other Course Evaluation & Assessment Requirements:	Theory testing 50% Practical application testing 50% Assignments 20%

In response to public health requirements pertaining to the COVID19 pandemic, course delivery and assessment traditionally delivered in-class, may occur remotely either in whole or in part in the 2021-2022 academic year.

Grade
Definition Grade Point Equivalent
A+ 90 - 100% 4.00
A 80 - 89%
B 70 - 79% 3.00
C 60 - 69% 2.00
D 50 - 59% 1.00
F (Fail) 49% and below 0.00

CR (Credit) Credit for diploma requirements has been awarded.
S Satisfactory achievement in field /clinical placement or non-graded subject area.
U Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR Grade not reported to Registrar`s office.
W Student has withdrawn from the course without academic penalty.

Books and Required Resources:

Heavy Duty Truck Systems by Sean Bennett
Publisher: cengage Edition: 6th

Course Outcomes and Learning Objectives:

Course Outcome 1	Learning Objectives for Course Outcome 1
Upon successful completion, the apprentice is able to perform adjustments and repairs to wheel end assemblies following manufacturers` recommendations.	Upon successful completion, the apprentice is able to: 7.1.1 Explain the fundamentals of wheel end assemblies. [0.5/0] - sliding and rolling friction - load carrying bearing - lubrication - tire and rim safety - safe wheel removal and installation procedures - hub-piloted - stud-piloted - cast spoke - multi piece 7.1.2 Identify the construction, composition, types, styles and application of wheel end assemblies. [0.5/0] - bearing and retaining locks - tapered roller - cups - cones - ball bearing - race - cage assembly - preset hubs - tire and rim safety - safe wheel removal and installation procedures - hub-piloted - stud-piloted

	- cast spoke - multi piece rims 7.1.3 Describe the principle(s) of operation of wheel end assemblies. [1/0] - lubrication - oil - grease - synthetic - API specifications - reduced maintenance - endplay - preload - preset hubs 7.1.4 Perform inspection and installation procedures of wheel end assemblies. [1/0] - visual inspection - bearing match - bearing endplay - bearing fit - hub condition - spindle condition 7.1.5 Recommend reconditioning or repairs following manufacturers`````` procedures on wheel end assemblies. [0/3] - remove and Install a wheel end assembly following recommended procedures using the following: - Technical and Maintenance Council (TMC) procedure - Original Equipment Manufacturers (OEM) procedure - inspect and service seals as required following manufactures recommended service procedures - bearing cleaning precautions - preset hubs
Course Outcome 2	**Learning Objectives for Course Outcome 2**
Upon successful completion, the apprentice is able to recommend repairs to hydraulic brake systems following manufacturers` recommendations.	Upon successful completion, the apprentice is able to: 7.2.1 Explain the purpose and fundamentals of braking system assemblies. [1/0] - Pascals law - laws of levers, mechanical advantages - friction - co-efficient of friction - brake fluids - servo-action - self-energizing

	- velocity and acceleration - torque multiplication - displacement - identify appropriate legislation governing brake systems (e.g. CMVSS-105) 7.2.2 Identify the construction features, composition, types, and styles of brake system components. [2/0] - brake lines and hoses - master cylinders - wheel cylinders - calipers - brake shoes and disc pads - drums and rotors - control and metering devices - self-adjusting devices - hand and parking brake cables - brake fluids 7.2.3 Describe the principles of operation of brake system components. [3/0] - master cylinders - wheel cylinders - calipers - shoes and pads - control and metering devices - self-adjusters - drums and rotors - hand and parking brake cables 7.2.4 Perform reconditioning or repairs following manufacturers` procedures for hydraulic system components. [0/6] - fabricate brake lines - bend - flare - double and bubble - service - master and wheel cylinder and bleeding of air from the system - calipers, mounting hardware, boots, and piston seals - shoes and pads, mounting hardware, and backing plates - adjusting devices - hand and parking brake assembly
Course Outcome 3	**Learning Objectives for Course Outcome 3**
Upon successful completion the apprentice is able to perform repairs to air brake systems	Upon successful completion, the apprentice is able to: 7.3.1 Explain the purpose and fundamentals of basic air brake systems. [1/0] - laws of levers

	following manufacturers` recommendations and statutory criteria.	- mechanical advantages - co-efficient of friction - pressure volume relationship - spring brake chamber calculations -potential energy - linear force - leverage - brake torque - brake friction factors - effects of vehicle load and speed - Canadian Motor Vehicle Safety Standards (CMVSS) 121 - Commercial Vehicle Safety Alliance (Out-of-service OOS citations) 7.3.2 Identify the functions, construction features, composition, types, and application of basic air brake systems. [2/0] - air supply system - primary service circuit - secondary service circuit - park/emergency circuit - foundation assemblies - S-cam - wedge - disc - slack adjusters - actuator- hoses, lines, and fittings 7.3.3 Describe the principle(s) of operation of wheel end assemblies. [4/0] - air supply system - primary service circuit - secondary service circuit - park/emergency circuit - foundation assemblies - S-cam - wedge - disc - slack adjusters - actuator chambers - hoses, lines, and fittings 7.3.4 Perform inspection and testing procedures following manufacturers` recommendations on air brake systems. [0/3] - foundation brake checks for: - stroke length - automatic slack adjusters - outline procedure for air compressor, air dryer, air receiver and testing - check governor operation - interpret pneumatic schematics - interpret statutory inspection safety criteria 7.3.5 Recommend reconditioning or repair following manufacturers` recommendations to air

	brake systems. [0/3] - demonstrate how to disarm spring brake chambers following recommended safe practices - service foundation components: - relining - machining practices - perform complete wheel-end service - disc brake components - demonstrate servicing pneumatic circuit components - perform air brake adjustment according to recommended procedures - interpretation of statutory specifications
Course Outcome 4	**Learning Objectives for Course Outcome 4**
GENERAL LEARNING OUTCOME Upon successful completion, the apprentice is able to recommend repairs to hydraulic brake systems following manufacturers` recommendations.	LEARNING OUTCOMES AND CONTENT Upon successful completion, the apprentice is able to: 7.2.1 Explain the purpose and fundamentals of braking system assemblies. [1/0] - Pascal`s Law - laws of levers, mechanical advantages - friction - co-efficient of friction - brake fluids - servo-action - self-energizing - velocity and acceleration - torque multiplication - displacement - identify appropriate legislation governing brake systems (eg. CMVSS-105) 7.2.2 Identify the construction features, composition, types, and styles of brake system components. [2/0] - brake lines and hoses - master cylinders - wheel cylinders - calipers - brake shoes and disc pads - drums and rotors - control and metering devices - self-adjusting devices - hand and parking brake cables - brake fluids 7.2.3 Describe the principles of operation of brake system components. [3/0] - master cylinders - wheel cylinders - calipers - shoes and pads

	- control and metering devices - self-adjusters - drums and rotors - hand and parking brake cables 7.2.4 Perform reconditioning or repairs following manufacturers` procedures for hydraulic system components. [0/6] - fabricate brake lines - bend - flare - double and bubble - service - master and wheel cylinder and bleeding of air from the system - calipers, mounting hardware, boots, and piston seals - shoes and pads, mounting hardware, and backing plates - adjusting devices - hand and parking brake assembly

Evaluation Process and Grading System:

Evaluation Type	Evaluation Weight
assignments	10%
practical application testing	50%
theory testing	40%

Date: September 17, 2021

Addendum: Please refer to the course outline addendum on the Learning Management System for further information.